

CHAPTER XV: COMPREHENSIVE DEVELOPMENTS, 1937-1973

Under the provisions of the 1936 Flood Control Act and subsequent legislation the Louisville District began providing flood protection for the Lower Ohio Basin in 1937. The first projects in the District were levee and floodwall, or local-protection, projects, a few of which were completed by 1945. In 1947 the scope of the District flood control mission was expanded by transfer of a portion of the Cincinnati Engineer District to Louisville; and about the same time construction of the first flood control reservoir in the District was commenced. Congressional authorization of addition project purposes — such features as recreation, fish and wildlife conservation, water supply, and pollution abatement — after the Second World War transformed the flood control program into a multipurpose, comprehensive program for water resource development; and the program became a major element of the revolutionary metamorphosis in the human environment of the Ohio Valley which occurred between 1945 and 1973.

Floods and Flood Control, 1937-1945

The first flood control structures completed in the Louisville District were high-benefit local-protection projects along the Ohio and Wabash-White rivers. From 1937 to 1945, the District completed planning and partially constructed fifteen local-protection projects around such communities as Indianapolis, Vincennes, Tell City, Jeffersonville, and Evansville, Indiana; Golconda, Brookport, Harrisburg, and Mound City, Illinois; and Paducah, Kentucky. A few projects for the protection of high-value agricultural lands in the Wabash Basin were also completed.¹

Due to the exigencies of military con-

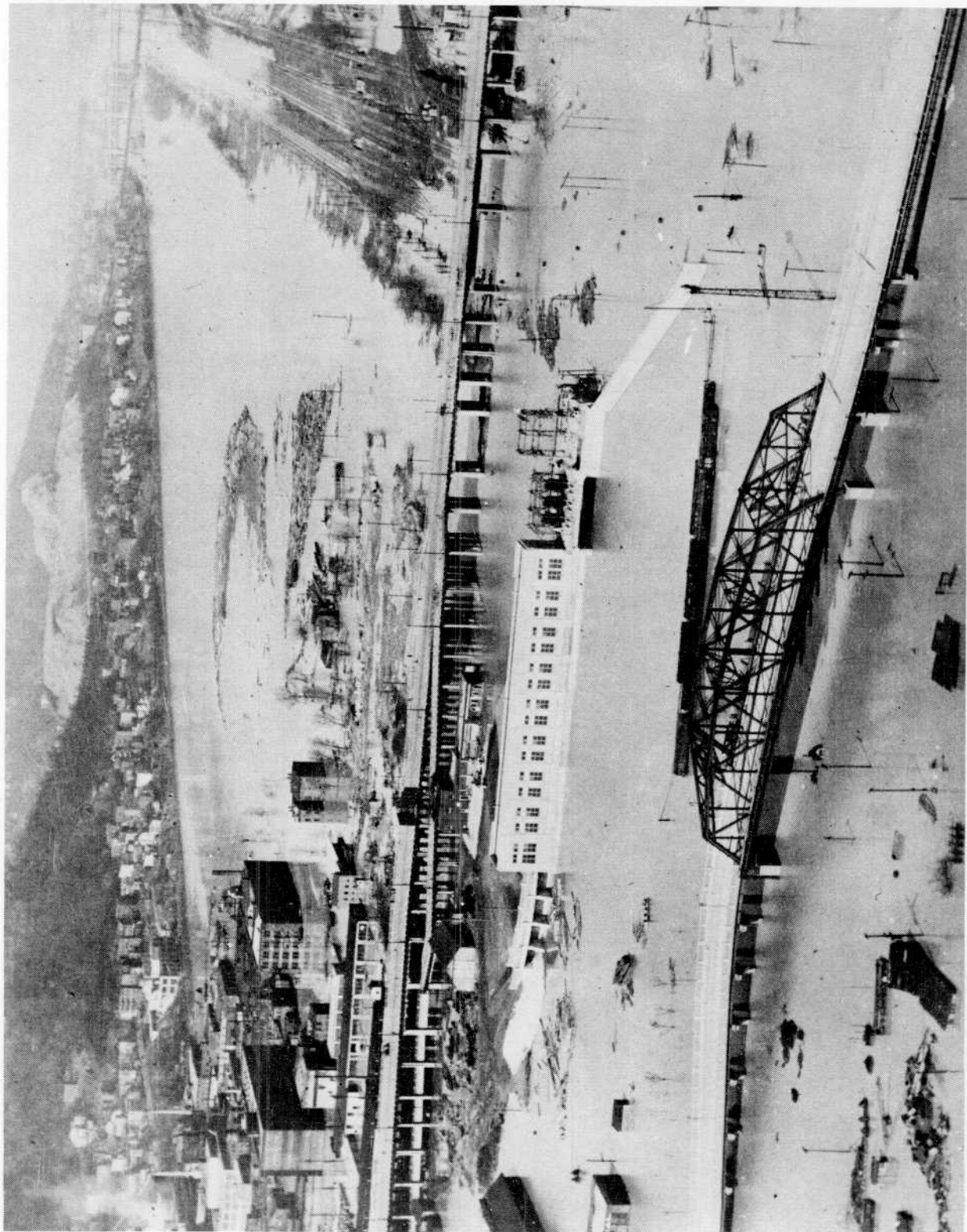
struction in 1942, most flood control projects in the Louisville District were suspended for the duration of the war. The suspension was later regretted, however, for the Ohio River Basin experienced severe flood losses during the war. The Wabash River flood of May, 1943, overtopped most levee projects along the river. Colonel C. L. Hall of ORD described the flood fight on the Wabash:

I started the troops on Monday night May 17, 1943. The rain started on Saturday night, May 15, 1943, and by Monday it became evident we were going to have a superflood, or it looked like it; and the commanding general of the Fifth Service Command very kindly met all my requests for troops. In the meantime, I had sent Engineer Department employees capable of handling the jobs to each of the danger centers. The troops arrived and helped out very greatly. Our principal rescue job was done at West Terre Haute, Ind. We had considerable difficulty there because a lot of the people did not want to move from their homes, and the greatest tact had to be displayed by the troops to persuade them they had better get out before they were drowned.²

A similar flood-fight ensued in March, 1945, on the Ohio River. Projects at Tell City, Indiana, and Golconda, Illinois, were completed in the Louisville District and operated satisfactorily during the flood; and emergency operations were conducted at partially completed projects. A 1747-foot temporary levee was hastily erected in the Jeffersonville-Clarksville levee and floodwall system; similar methods were employed at Evansville, Indiana, and Mound City, Illinois, projects; and pumps were installed and gate-openings sandbagged at other projects. These emergency measures contributed substantially to the estimated \$29,000,000 flood damages prevented by the flood control structures in the Ohio River Basin



Box Construction at Vincennes, Indiana
Flood Emergency Work



Mill Creek Barrier Dam under construction—1945 Flood
Cincinnati, Ohio

during the flood, but damages were still heavy. Twenty-four people lost their lives; 188 war-production plants were shut down and production curtailed at another 93; and the vital work at Army Ordnance plants was disrupted by materials shortages and flood-related absenteeism.³

In 1946, the president of the Ohio Valley Improvement Association described the flood disaster of 1945 to the House Committee on Flood Control and presented a resolution of the OVIA which read, in part:

The Ohio Valley has now proved that it is capable of constituting the Citadel of Defense of the Nation in wartime. It is imperative that the industry, communications, and community organization of this region be protected effectively against the suspension of production, disruption of supply, and the breakdown of life and order which recurrently threaten so long as floods are permitted to continue a menace.⁴

Local Protection Projects

With the cessation of hostilities in 1945, work resumed in the Louisville District on local-protection projects. This type of project consisted of earth-levee construction, drainage systems, concrete floodwalls, pumping plants, closure structures, channel rectifications to increase flood-carrying capacity, and many complex combinations thereof. These projects were ordinarily designed to protect a limited area, usually an urban and industrial concentration, against the maximum flood of record. A few projects in the Wabash Basin for the protection of agricultural properties, however, were designed to protect only against "cropping season" floods. Earth-embankment levees, with openings for roads and railroads closed with movable gates, panels, and sandbags during flood alerts, were the most common type of local-protection project. Concrete floodwalls were often substituted,

however, where land acquisition costs were exorbitant. Sewerage discharge and interior runoff within levee systems were disposed of by the construction of pumping plants to pump over the levees during high-water periods. Pumping plants in the Louisville District varied in size from small pumps in manholes to the very large plants at Cincinnati (Mill Creek Plant) and Louisville (Beargrass Creek Plant).⁵

The benefits of local-protection projects, as the name implied, accrued principally to the area protected; and federal law provided that the communities receiving the benefits cooperate in the project by providing lands, easements, and rights-of-way, paying damages resulting from construction, and maintaining and operating the project after completion. One problem experienced in the Louisville District, as elsewhere, was the reluctance of communities to tax themselves to fund local cooperation requirements. On occasion, Congress authorized projects but local interests did not meet cooperation requirements until after serious flood damages had awakened the entire community to the need for the project. And in some cases communities failed voluntarily to meet their obligations after the project was completed. Congress provided in the 1970 Flood Control Act that local-protection projects should not be constructed until nonfederal agencies signed legal contracts binding them to meet their full obligations.⁶

By 1956 the Louisville District had completed 43 local-protection projects and had 13 under construction. Many more were completed by 1975. Most of these projects are quite similar in construction, though each was unique because of variations in the flood problem at each locality. A few, however, were of special interest.

The first bond issue for the immense

local-protection project at Louisville, Kentucky, was approved by a referendum on November 5, 1940. Original project plans provided for over eight miles of earth levees and three miles of concrete floodwalls, plus fourteen pumping plants to protect the Falls City from floods the magnitude of that of 1937. Construction commenced in 1947 and was completed in 1956, with later additions and modifications completed as experience and growth of the city proved necessary. In 1972 citizens of Jefferson County passed a bond issue to meet local cooperation requirements for a project to protect a rapidly growing section of Jefferson County adjacent to Louisville.⁷

The Cincinnati local-protection project, which became the responsibility of Louisville District in 1947, had, in addition to the usual levees and floodwalls, a barrier dam across Mill Creek to prevent Ohio River flood-waters from inundating the heavily industrialized Mill Creek Valley section. At times of flood in the Ohio, the barrier dam was closed and the entire flow of Mill Creek pumped over the protective structures into the Ohio. The project was about 85% complete when Louisville acquired it in 1947. It was completed, at costs of \$9,973,000, just before the flood of 1948, and in its first year of operation prevented an estimated \$4,700,000 in flood damages — nearly half the construction costs.⁸

The Newport, Kentucky, project, across the Ohio from Cincinnati at the mouth of the Licking River, originally called for the construction of an 8000-foot levee and a 4000-foot concrete floodwall. Because of unstable foundation conditions along the Licking River front at Newport, the District adopted the somewhat unusual method of constructing a floodwall of cellular piling; that is, interconnected steel-

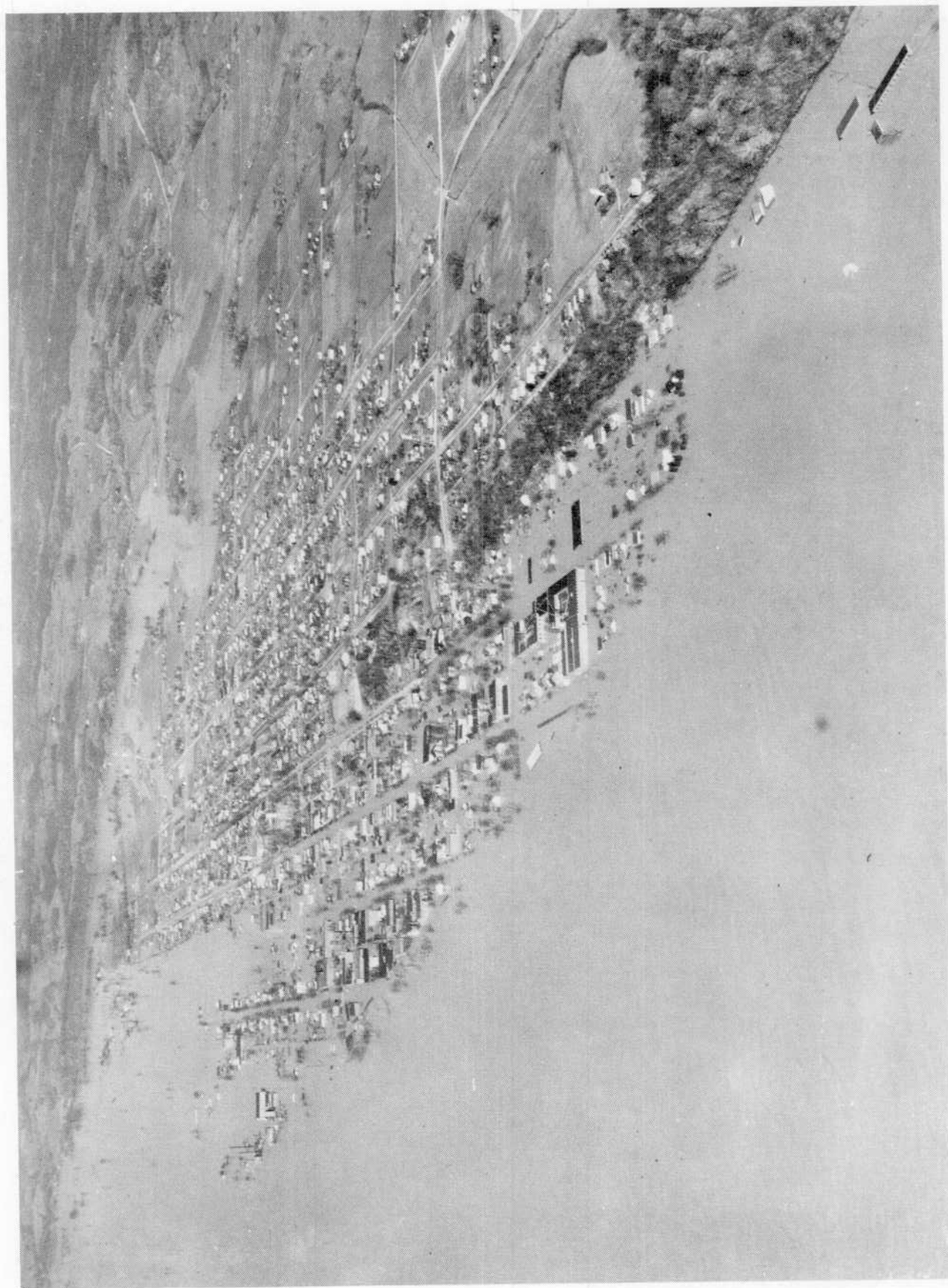
piling cells filled with sand and gravel similar to cofferdams frequently used in constructing navigation projects on the Ohio.⁹

Hawesville (Hancock County), Kentucky, on the Ohio about thirty miles northeast of Owensboro, was hit hard by floods in 1937, 1945, and 1948, but Corps studies indicated that construction of an adequate local-protection project would require local contributions of \$28,000. The population of Hawesville was less than a thousand, and assessed property valuation was less than \$300,000. A bond issue for the project was not negotiable so in 1946 the community began "passing the hat." With only a single outside contribution of \$2,000, the town collected the necessary sum in four years — with an average donation of thirty dollars per resident — and Hawesville had its floodwall by 1953.¹⁰

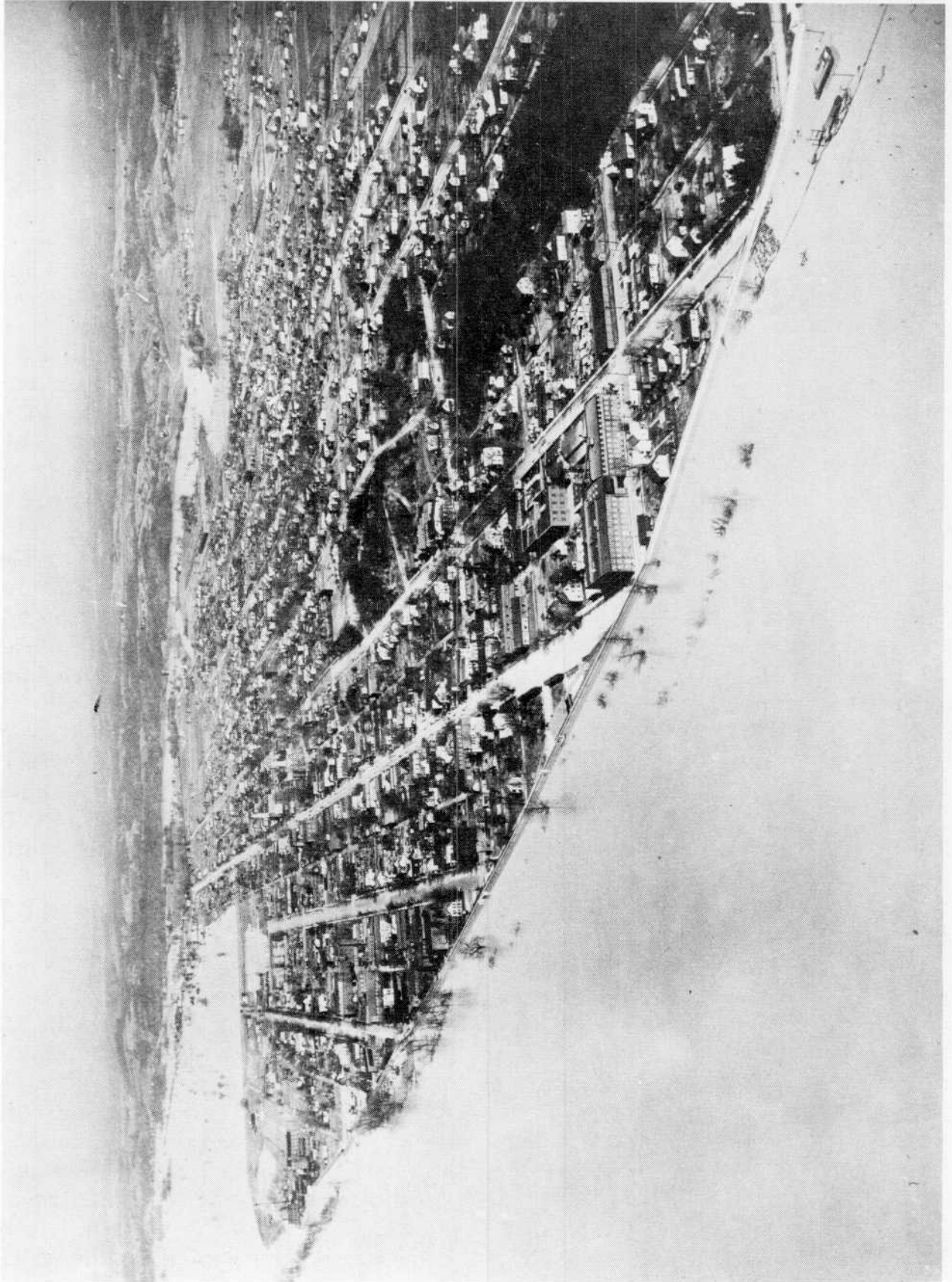
Reservoir Projects

When the Cincinnati Engineer District was deactivated on January 1, 1947, and its geographic area divided between Louisville and Huntington Engineer Districts, the Louisville District boundary was adjusted to include Locks and Dams Nos. 34 to 39 on the Ohio, the fourteen locks and dams on the Kentucky River, local flood protection projects under construction at Cincinnati, Ohio; Lawrenceburg, Indiana; and Newport and Covington, Kentucky, and others in planning stages. No reservoirs were under construction at the time of transfer, but the Cincinnati District was studying authorized projects in the Licking River (of Kentucky) Basin, the Kentucky River Basin, the Miami and Little Miami River Basins, and Mill Creek Reservoir in Hamilton County near Cincinnati.¹¹

Though neither the Cincinnati nor Louisville Districts had reservoir projects



Tell City, Indiana without floodwall in 1937



Tell City protected from 1945 Flood by floodwall

under construction as of January 1, 1947, several proposed reservoirs were in final planning stages. During the following quarter-century, the Louisville District completed a major reservoir project on the average of one every two years. By 1972 the Louisville District had completed twelve reservoirs for flood control and allied purposes, had nine under construction, and several others in active planning stages; and by that date so many project features in addition to flood control had been authorized that the projects were better described as multiple purpose, rather than flood control, reservoirs.

Wabash Basin Reservoirs

The first reservoir planned in the Wabash Basin was Shoals Reservoir at a proposed damsite near Shoals, Indiana, on East Fork of the White River. The project was authorized by the Flood Control Act of 1938, and the Flood Control Act of 1941 included hydroelectric power production generation as a project feature. The Louisville District reviewed plans for the Wabash Basin in 1944 and found that two additional reservoirs — Spencer and Wolf Creek projects — would also be economically feasible. But at public hearings on the three projects in 1945 great opposition to the proposed Shoals, Spencer, and Wolf Creek projects was expressed. The Governors of Illinois and Indiana, in effect, vetoed the proposed projects. Governor Ralph F. Gates of Indiana explained:

We believe that it would be advisable to start the reservoir program within our State with reservoirs of smaller size. By that we mean smaller areas of inundation that would not remove from some of our county-tax duplicates the major portion of the properties subject to taxes to support our schools and county governments. It has been noted by the Indiana Flood Control commission that one reservoir stands out above all the rest in its economic

possibilities. This reservoir is known as the Cagles Mill Reservoir.¹²

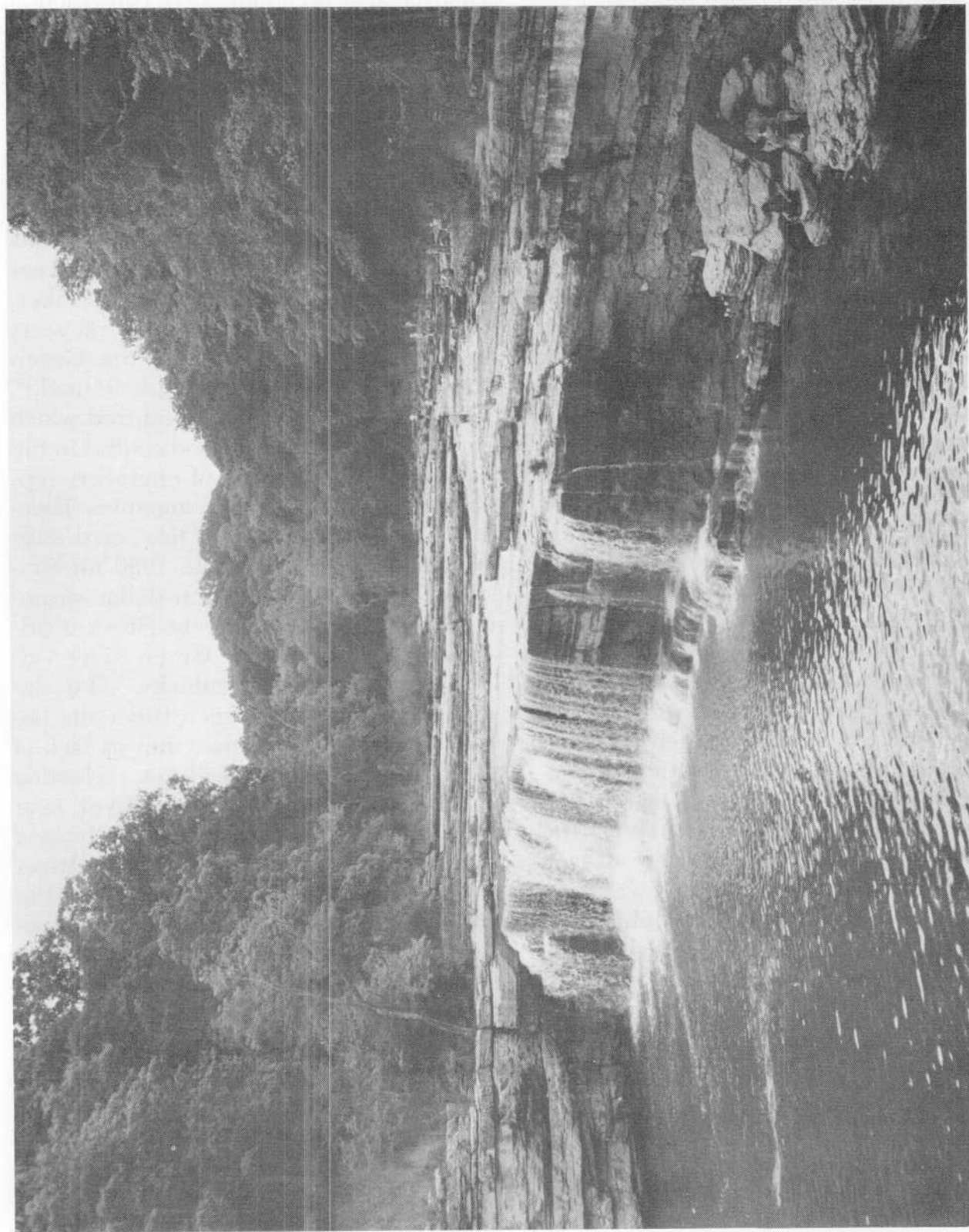
The Board of Engineers for Rivers and Harbors and the Chief of Engineers concurred with the Governors, and the three large reservoirs were therefore dropped from Wabash Basin plans. Construction of Cagles Mill Reservoir project, the first in the Louisville District, was undertaken as recommended; it was to be a sort of proving ground where Hoosier doubts and fears could be allayed.¹³

Cagles Mill Dam and Lake, on Mill Creek, a tributary of the Eel River, about midway between Terre Haute and Indianapolis, Indiana, was designed as a multipurpose project for flood control and recreation. The first tract of land was acquired in February, 1948; construction was begun in July, 1948; and the project was completed in June, 1953. The dam, like most subsequent projects of this type in the Louisville District, was an earth and rock-fill embankment, with a maximum height of 150 feet and length of 900 feet. The normal pool for recreation had an area of 1400 acres, with room for storage of 201,000 acre-feet of flood water — equivalent to 12.8 inches of runoff from the 295 square-mile drainage area. Recreation facilities were developed by the State of Indiana. Cagles Mill was drained in 1971, after nearly twenty years of operation, and about a million pounds of rough fish were removed, while game fish were saved for restocking purposes. The Louisville District carefully inspected the condition of the project at that time and found that siltation was minimal and the dam outlet structure was in excellent condition.¹⁴

Mansfield Dam and Lake, a few miles northwest of Cagles Mill on Raccoon Creek, tributary of the Wabash, was the second reservoir completed in the Wabash Basin. Also built for flood control and rec-



Cagles Mill Lake, Indiana



Cataract Falls at Cagles Mill Lake, Indiana

reation, with the state managing the recreational facilities, it was similar in many respects to the Cagles Mill project.¹⁵

The second series of reservoir projects in the Wabash Basin was authorized by the Flood Control Act of 1958. This authorization marked the end to the original hesitant support of the State of Indiana for reservoir projects, for to obtain approval for the projects Indiana had to agree to pay portions of the costs of construction. Construction of Monroe, Huntington, Salamonie, and Mississinewa reservoirs was authorized, provided the state paid construction costs allocated to low-flow regulation features at Monroe and land-enhancement values at the other three. Monroe Lake was built on a tributary of the East Fork of the White River in south-central Indiana, and the other three, often called the "Lakes of the Wabash" because of their high recreation value, were built in the Upper Wabash Basin to operate as a unit for flood control. All four projects were essentially complete by 1970.¹⁶

The third series of Wabash Basin projects was authorized by the 1965 and 1968 Flood Control acts, which provided that local interests pay a portion of construction costs allocable to recreation and conservation and administer the recreation-conservation program at each project. This series included Louisville, Helm, and Lincoln Lakes in Illinois, and Downeyville, Big Blue, Clifty Creek, Lafayette, Big Walnut, Big Pine, and Patoka lakes in Indiana. All were in various planning, land acquisition, and construction phases in 1975.¹⁷

Green River Reservoirs

Seven reservoir projects for flood control were recommended for the Green River Basin in the "308 Report" of 1933, and after the 1937 flood, during which as

much as 25 inches of rain fell at several points in the Green Valley, the Louisville District also recommended construction of a large reservoir project — the Mining City, or Rochester, Dam — located just above Lock No. 3, Green River, to control the great water volume generated by storms the magnitude of that of 1937. The Mining City reservoir was opposed because of its possible effects on Mammoth Cave, and the other proposed projects were opposed by residents of the areas which would be inundated by the lakes. Opposition was so strong for several years that flood control plans for the Green River Basin could not be implemented.¹⁸

But in 1950 an incident occurred which galvanized support for flood control in the Green Valley. A group of engineers representing private power companies (Electric Energy Incorporated) inspected sites in the Ohio Valley in late 1950 for construction of a multi-million dollar steam-electric plant; and one of the sites considered was located in the Green River Valley near Paradise, Kentucky. The engineers rejected the Green River site because of its flood problem and its lack of adequate navigation facilities, selecting instead a site on the Ohio River near Joppa, Illinois (Mile 952). Partially as a result of this incident, the Green River Valley Citizens League was organized in 1951 to promote the economic development of the Green River region; and at its first policy meeting the League resolved that flood control was vital to the future development of the region, that the Mining City reservoir project be held in abeyance, and that four other reservoirs — on Nolin, Rough, and Barren rivers and at dams site No. 2, Green River, above Mammoth Cave — be constructed at an early date.¹⁹

The four reservoir projects for which the

Citizens League organized support were completed and in operation by 1975, but their construction was accomplished only after extensive political controversy, which was a classic example of the "upstream versus downstream" conflict often met by the Corps and other water-resource development agencies. The Citizens League represented those interests, chiefly from downstream, which needed flood protection and desired the economic development which reservoir projects frequently stimulate. Opposition to the projects was strongest among those whose homes were located in the reservoir areas — the "upstream" interests.²⁰

When the Barren River reservoir project was under consideration, the Superintendent of Schools of Barren County eloquently presented the case for the "upstream" interests, saying:

You take our birthright for a poor mess of pottage that comes in a fisherman's paradise. It seems to me the Lord gave us Wisconsin and Minnesota as our lake country, and planned Kentucky as a State for agricultural pursuits. Should we cover this rich land, we would be guilty of burying our talent without cause. Those lower valleys of our county, and the rich land of Allen and Monroe counties are not wild and desolate. . . . Can you cut a man from his people, his cemetery, or his church and call such an act a move for the general welfare. Take these people and their homes — a man's home is his, and a castle it is, though it might not value a thousand dollars. This immeasurable and intangible American tradition cannot be treated lightly.²¹

The views of the "downstream" interests were reflected in an editorial in the Louisville *Courier-Journal* complimenting the work of the Green River Valley Citizens League. It read in part:

These dams on the Green, Barren, Nolin and Rough Rivers will eventually free this part of the State from floods, make the Green navigable by major barges and provide a year-around supply of industrial water that will make possible the industrial development of the region. For the past 15 years the towns along the Green River Valley have

been losing population, jobs and income, though the hills along the river are rich with some of the world's largest reserves of coal. The river-development plan will help reverse this economic trend.²²

Salt River Reservoirs

The Salt River, which joins the Ohio a few miles below Louisville, has all the problems of larger rivers in microcosm. It was famous in the nineteenth century for its navigational difficulties — "up Salt Creek without a paddle" — and its floods, which reportedly rose fast enough "to catch a squirrel running up a tree." Salt River navigation was never improved by the Corps; however, the Louisville District planned projects to reduce the flood problem. Nevertheless, though flood damages in the Salt Basin averaged 1.7 million dollars annually, the only flood protection completed in the Basin in 1973 was a floodwall at Taylorsville, Kentucky.²³

The Louisville District planned three reservoirs in the Salt River Basin for flood control and other benefits (recreation was important because of the proximity of the projects to the Louisville metropolitan area). Proposed sites were Taylorsville Lake on the main stem of the Salt, Camp Ground Lake on Beech Fork, and Howardstown Lake on Rolling Fork. The Taylorsville reservoir was approved by Congress in 1967 and was in preconstruction stages in 1973. Congress also approved Camp Ground Lake in 1972, but the bill authorizing the project was vetoed by the President.²⁴

The controversial Howardstown Lake project was not favorably received at public hearings in 1967. Colonel John T. Rhett, Louisville District Engineer, said, "It appeared that local people didn't want it, and it's not our business to go around building dams where people don't want

them.” But repeated flooding brought renewed support for the project in 1971, when its proponents launched a public campaign on behalf of the recreational and economic development expected to accompany construction of the project. On the other hand, a citizen of Howardstown said:

The purpose of all this commotion was to take from people their farmland, or livelihood, their homes and church in order to create recreation for the boat and liquor industries and their users.

It seems they would rather create a Sodom and Gomorrah than to let mankind and its habitat survive in this area.²⁵

Kentucky River Reservoirs

The “upstream-downstream” conflict was also evident when the Louisville District inherited the Kentucky River Basin projects from the Cincinnati District in 1947. The “308 Report” on the Kentucky River recommended construction of three reservoirs — Buckhorn on Middle Fork, Booneville on South Fork, and Jessamine Creek on the main stream. Of these three, only Buckhorn Lake, completed in 1960, was in operation in 1975. Jessamine Creek, the mainstream reservoir, because of the large area it would inundate and the number of historic sites it would cover, had great opposition and was deleted from project planning for the Kentucky Basin.²⁶

Booneville Lake on South Fork was still being vehemently debated in 1973, and was a particularly divisive subject in Owsley and Clay County, Kentucky, where the reservoir would be located. One Owsley countian said the residents of the region were satisfied with the way things were and chiefly wanted to be let alone; another declared that Owsley County had the lowest per-capita income in the United States and badly needed the economic opportunities the project would provide.²⁷

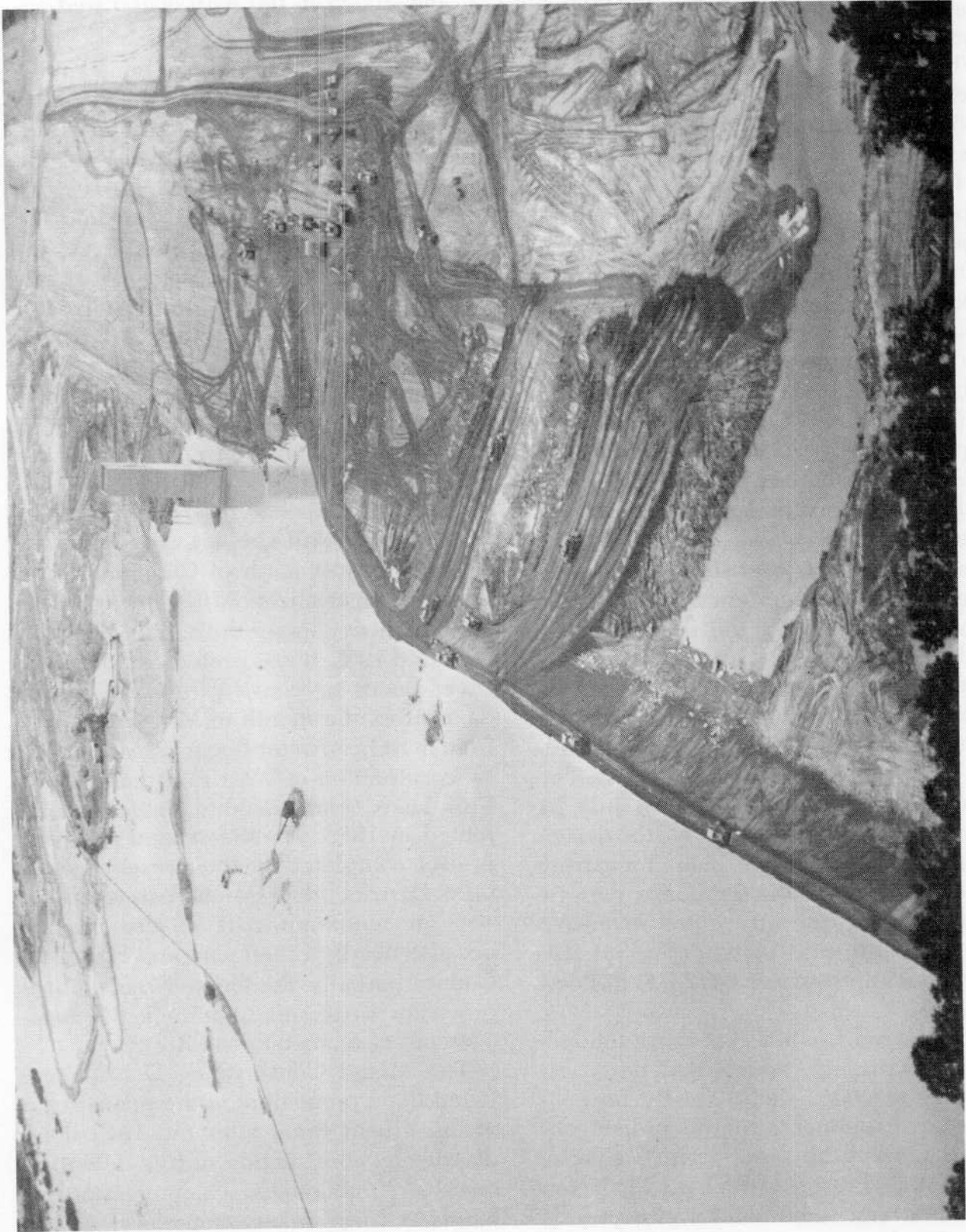
Disaster struck the Kentucky Basin in January, 1957, when a flood caused damages amounting to \$11.7 million. President Dwight D. Eisenhower declared the region a “major disaster area,” and the Corps moved in, established emergency field offices at Hyden, Hazard, Pikeville, and Manchester, Kentucky, and performed repair and rehabilitation work. In the aftermath of the flood, the Louisville District reviewed flood control plans for the Kentucky Basin and recommended construction of three additional reservoirs on the Kentucky River tributaries Eagle Creek, Red River, and Carr Fork. Senator Thruston B. Morton of Kentucky commented:

Two of the reservoirs, Carr Fork and Red River, are located in regions of Kentucky where economic conditions are depressed. Creation of reservoirs will provide the potential for recreation and tourism and the basis for self-sustaining local endeavor. There is also a great interest in the impoundments as a source of water for municipal and industrial uses.²⁸

The Louisville District had Carr Fork reservoir project under construction in 1973 and was preparing detailed plans and environmental impact statements on the other two projects.

Licking River Reservoirs

Falmouth and Cave Run reservoirs on the Licking River of Kentucky were among the first fourteen reservoirs authorized for the Ohio River Basin in 1936, but their construction had not been commenced when the Licking Basin was transferred from Cincinnati to Louisville Engineer District in 1947. Both reservoirs were quite large; land acquisition costs were high; and the usual upstream-downstream conflict developed over their advisability. Citizens of the lower Licking Basin, especially in the Cincinnati met-



The Cave Run Emergency—1971

ropolitan area, strongly favored the projects; and citizens of the region where relocation would be necessary just as strongly opposed.²⁹

The Cave Run reservoir was finally funded in 1962 and construction began in 1965, but completion of the project was delayed by several developments, notably the flood of July, 1971, which nearly overtopped a temporary diversion dam at the project site.

Drenching thunderstorms in the Upper Licking Basin on July 17-19, 1971, created a near-record flood situation; and a diversion dam, designed to divert the total flow of the Licking River through outlet works while construction of Cave Run Dam was in progress, began impounding floodwaters. That is, the volume of water behind the diversion dam increased faster than the outlet works could pass and threatened to pour over the top of the diversion dam. Rumors circulated that the dam was failing and the flood running wild down the river. The area below the dam was evacuated as a precautionary measure, and emergency work was initiated to raise the temporary dam, sandbag the top, and build a spillway. The flood crested at the damsite on July 21 nearly one and a half feet above the design height of the diversion dam. Increasing the crest-height of the temporary dam by three feet not only prevented extensive damage at the construction site, but also prevented an estimated \$412,000 in flood damages.³⁰

It appeared in 1972 that the Falmouth reservoir project, which had been authorized in 1936, would finally be constructed. Proponents of the project obtained funding approval from Congress, and though President Richard M. Nixon vetoed several flood control project bills in 1972 he approved the Falmouth

project.³¹

Reservoirs in the Whitewater and Miami Basins

Three streams, with basins lying largely in southwestern Ohio, have their confluence with the Ohio River at and near Cincinnati. The Little Miami River joins the Ohio just above Cincinnati; Mill Creek runs through the "Queen City;" and the Miami River, the largest of the three, enters the Ohio below Cincinnati at the Ohio-Indiana state line. The Whitewater River, whose basin lies principally in Indiana, joins the Miami River just above its confluence with the Ohio. Responsibility for water resource development in these basins was also transferred to Louisville District in 1947.

Mill Creek has one reservoir, known as West Fork of Mill Creek Lake, in Hamilton County just north of Cincinnati. The highly industrialized Mill Creek Valley suffered heavy losses during the floods of 1937 and 1945; it was protected from Ohio River floods by construction of a barrier dam across the mouth of Mill Creek, and from most headwater floods on Mill Creek by construction of West Fork Lake. West Fork Lake, commenced in 1949 and completed in 1952, was the second reservoir project completed in the present Louisville District. Recreation features were also an important part of the project, because nearby Cincinnati, and Hamilton County partially reimbursed recreational provision costs and undertook the management of recreation facilities.³²

The Miami Conservancy District provided flood protection on the mainstream of the Miami River after the 1913 flood disaster by construction of five detention reservoirs and related channel improvements. A Corps reservoir project — Clarence J. Brown Reservoir — was au-

thorized in 1962 for construction on Buck Creek, which joins Mad River, tributary of the Miami, above Huffman dam (an MCD project). Springfield and Clark County, Ohio, were above the flood protection provided by the Miami Conservancy District, and Clarence J. Brown Reservoir, nearing completion in 1973, was designed to protect Springfield and the Mad River Basin above Huffman Dam.³³

The 1938 Flood Control Act authorized two reservoirs on the Whitewater River, a tributary of the Miami, which flows from eastern Indiana to join the Miami in the extreme southwestern corner of Ohio. Brookville Reservoir, on East Fork of the Whitewater, was under construction and nearing completion in 1973, while the proposed Metamora reservoir project on the Whitewater was deferred for restudy.³⁴

The Louisville District had two reservoir projects under construction in the Little Miami Basin east and northeast of Cincinnati in 1973. Caesar Creek and East Fork reservoirs, originally authorized for flood control alone in 1938, were multipurpose projects by the time construction began in the early 1970s. Project designs included provisions for recreation, fish and wildlife conservation, and storage for water supply and water quality control in addition to flood control.³⁵

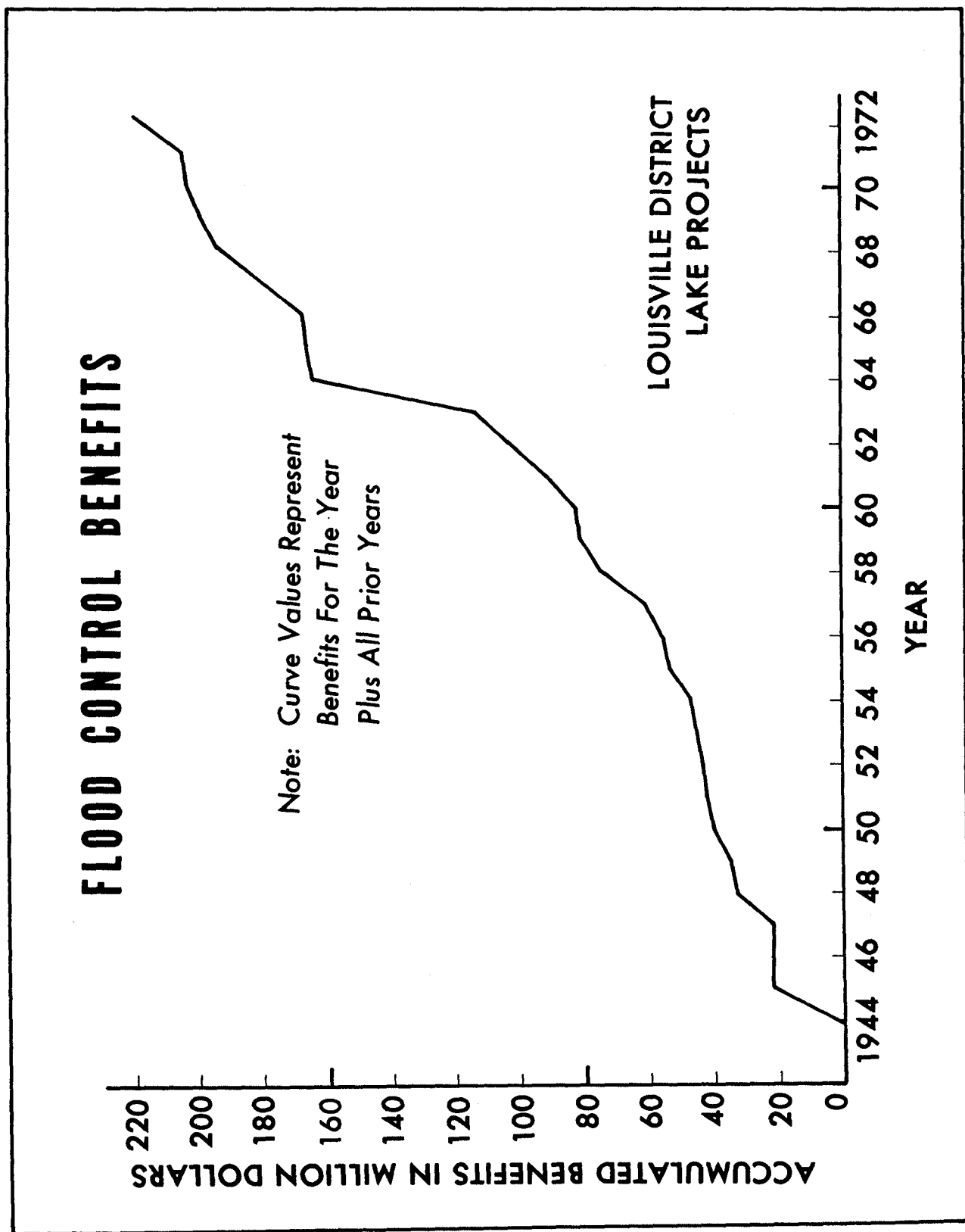
District Flood Control Construction Review

During the first decade of flood control construction, 1937-1947, the Louisville District built high-benefit, quick-result, local flood protection projects, involving levees, floodwalls, pumping systems, and channel rectifications, to protect urban and high-value agricultural lands. These projects were designed as integral components of the Ohio River Flood Control

Plan, which provided a flexible outline for the achievement of flood protection through the completion of local protection projects, especially on the banks of the Ohio, and reservoirs on tributaries. Construction of local-protection projects was initiated first because they provided quick protection and because flood damages had been so heavy at riverside communities that they were willing to meet their local-cooperation requirements. But reservoir construction was delayed, at first because of hiatus necessitated by the scope of the military mission during the Second World War and then by the "upstream versus downstream" conflict.

Public and political opposition to the very large reservoirs — Jessamine Creek on the Kentucky River, Mining City on the Green River, and Falmouth on the Licking River — were so intense that congressional approval did not appear likely for many years. In the meantime, the District devoted increasing attention to smaller reservoirs in upper tributary valleys where sufficient support for authorization and funding existed and which could achieve a substantial measure of flood control if constructed in large numbers.

Cagles Mill Lake in Indiana and West Fork of Mill Creek Lake in Hamilton County, Ohio, commenced in 1948 and 1949 respectively, were the first reservoir projects completed in the Louisville District. These, and similar projects in other Engineer Districts, demonstrated that multipurpose projects could provide substantial benefits and stimulate economic development in the immediate reservoir area, as well as reductions in flood damages in downstream areas. During the 1950s the public and political opposition of "upstream" interests to reservoir projects began to break down as the advantages of multipurpose projects, as opposed



to single-purpose flood control reservoirs, was increasingly recognized. During the 1960s, reservoir projects were authorized and placed under construction in the Louisville District, as elsewhere in the nation, in steadily increasing numbers. By 1973 the Louisville District had completed twelve reservoir projects, was constructing nine, and had more than a dozen in planning stages.

Multipurpose Project Features

The ideal flood control reservoir would probably be similar to the single-purpose projects constructed in the Miami River Basin after the flood of 1913; that is, reservoirs which are empty of water until a flood situation develops, with their entire capacity available for flood water storage. But, as General Hiram M. Chittenden and other engineers observed early in the twentieth century, reservoir project benefits may be multiplied by the provision of water storage for other purposes, such as recreation and water supply. Multipurpose projects can require higher dams and larger reservoir areas, may permanently inundate more land and require more population relocation than single-purpose projects for flood control. On the other hand, multipurpose project benefits may be so high that upstream and well as downstream interests will support the projects, even to the extent of participating, both financially and otherwise, in the development and management of such project features as recreation, fish and wildlife conservation, and water supply. It therefore appeared that the implementation of flood control plans for the Ohio River Basin in the Louisville District was made politically feasible by the expansion of the original flood control program of 1937 into the comprehensive, multipurpose program of 1973. A review of the

overall history of some of the project features added to flood control after 1937 will provide some index to their importance.

Recreation

The Flood Control Act of 1944 authorized the Corps of Engineers to develop recreational facilities at its water resource development projects, and such facilities were first constructed in the Louisville District at navigation locks and dams. Most locks and dams had small, beautifully-kept reservations, with green lawns, shade trees and gardens. Fishing and picnicking near the locks and dams, and watching boats lock through became surprisingly popular during the 1940s. During the summer of 1947, for example, an average of 3,650 people visited the locks in the Louisville District each Sunday. The District initiated a program to provide minimum recreational facilities at the lock reservations about 1946. Sites with shade trees and a view of the river were selected; the lock forces built picnic tables with surplus materials and installed them; and fireplaces, drinking water, and sanitary facilities were added as seemed appropriate.³⁶

Because the first reservoirs in the Louisville District were not constructed until after 1944, the District was able to provide recreational features at its first reservoirs; and public use of recreational opportunities was unexpectedly heavy. The growing population of the Ohio Valley, with larger real income, more leisure time, and, because of the automobile, greater mobility, thronged to reservoir projects during the 1950s. General John Person, Louisville District Engineer, 1948-1950, said in testimony before the Senate Committee on Public Works in 1957:

At the time we built our [first] projects we did

not anticipate and I think could not have anticipated the very extensive and growing use and enjoyment by the public of the water areas in those reservoirs. They are used for fishing, boating, swimming, camping, picnicking, and related activities. Such use had increased from 16 million visits [Corps-wide] annually in 1950 to more than 70 million visitor days in 1956.³⁷

Full consideration of recreation as a purpose in project formulation and evaluation, giving new importance to recreation values, was approved by President John F. Kennedy in 1962. By 1968 the Corps of Engineers was serving more visitors (170 million) at its projects than any other federal agency; and recreational use of Corps projects was increasing at a rate exceeding that of any other federal agency. In 1972 the 400 Corps projects with recreation areas recorded 300 million "recreation days." This national "recreation explosion" stimulated support for reservoir projects in "upstream" areas near reservoir sites because the projects would provide nearby recreational opportunities and direct economic benefits by creating a tourist-service industry.³⁸

Water Supply

The water Supply Act of 1958 authorized the Corps of Engineers to plan water storage features in reservoir projects to serve the anticipated needs for industrial and municipal water supply. This authorization brought added support for reservoir projects from "upstream" interests in the Louisville District. Many communities experienced water shortages in the Louisville District during the drought of 1963 and became convinced they needed a dependable water source to meet their projected needs. This was particularly true at Glasgow, Kentucky (Barren River Reservoir); Leitchfield, Kentucky (Rough River Reservoir); Campbellsville, Kentucky (Green River Reservoir); Frank-

fort and Lexington, Kentucky (Red River Reservoir); and there was a marked increase in the interest in project water supply features in Indiana, where state government contracts for storage.³⁹

Water Quality

Water pollution problems have existed since the settlement of the Ohio Valley. Historian Henry McMurtrie observed in 1819 that construction of the Louisville and Portland Canal might alleviate the problem in the Louisville harbor and Beargrass Creek "whose sluggishness during the summer is . . . productive of consequences injurious to the health of the inhabitants of the town." The Corps of Engineers, as hydraulic experts, were also concerned with water pollution at an early date. Major Amos Stickney, Louisville District Engineer, 1886-1890, for example, conducted a campaign to stop the discharge of raw sewage from Louisville into the Ohio above the canal, asserting:

It is hardly necessary . . . to adduce proof of the ill results that might be expected from the impounding of such a quantity of the decaying and fetid matter that is constantly cast off by a populous city. The health of the employees of the canal, the durability of the various structures in it, and the health and well-being of all the inhabitants of the portion of the city fronting the canal, would undoubtedly be seriously affected.⁴⁰

Great public concern about the water-pollution problem in the Ohio Valley was first aroused in 1931 when, after the drought of 1930, an epidemic of gastroenteritis, directly attributable to the emission of untreated sewage into the waterways, swept down the Ohio River with the spring rise of 1931. This epidemic and similar incidents resulted in the organization of the Ohio River Valley Water Sanitation Commission (ORSANCO) to direct improvement of water quality in the Ohio

Basin under the authorities of the interstate Ohio River Sanitation Compact, and the authorization of a federal study of water pollution in the Ohio Basin — the first of its kind in the nation.⁴¹

One of the proponents of federal action on the water quality problem, Congressman Brent Spence of Kentucky, said in 1937 that the Ohio River, because of the volume and variety of wastes discharged into it, should be the “great national laboratory where this problem of such vital interest to the people may be solved.” Congress prepared to authorize such a study in 1937, but was uncertain whether its performance should be assigned to the Corps of Engineers or the Public Health Service. General Edward M. Markham, Chief of Engineers, urged assignment of the mission to the Corps:

This organization is entirely familiar with the streams involved and possesses a large amount of data relating thereto which is essential in the determination of the best methods for pollution control. The feasibility of using this organization becomes apparent when it is realized that the solution of the pollution problem is an engineering matter. It is closely related to the hydrology of the streams with particular reference to the increase in their low water flow through the operation of dams and reservoirs authorized for flood control and for navigation.⁴²

General Markham referred in his last sentence to “low-flow augmentation,” or controlled releases from reservoir to aid in maintaining navigable depths and reducing pollution problems which often developed during dry, low-water seasons. Even the Davis Island navigation project, completed on the Upper Ohio in 1885, was credited with reducing water pollution problems in the Pittsburgh area. “Low-flow augmentation” has been derided as mere “pollution dilution,” but during the drought of 1963, when over 50% of the total flow of the Ohio River was

provided by releases from reservoirs, problems would have been much more acute and even hazardous to public health without this additional water supply. Graphically stated, the Ohio might have resembled in 1963 a residential flush commode where use continued when water for flushing was not available.⁴³

But reservoir projects with “low-flow augmentation” features had not been constructed in the Louisville District in 1937, when Congress decisively assigned the Ohio River pollution study to both the Corps and the Public Health Service. The cooperative report, described by the Chief of Engineers as the “most complete and comprehensive examination ever made into the sanitary conditions of a major river and its tributaries,” was completed in 1943. This report provided detailed information about the seriousness of the Ohio Basin pollution problem and recommended vigorous countermeasures. But the national military effort engrossed public attention in 1943 and the report received little attention from either Congress or the public, and only minimal action was taken on its sweeping recommendations.⁴⁴

During the quarter-century following completion of the 1943 report, ORSANCO accomplished much toward improving water quality in the Ohio Basin, but the Corps was not involved to any great extent in the solution of the problem. The Water Pollution Control Act of 1961 authorized the Engineers to include water quality and flow regulation features in water resource project planning on a general basis; and in the late 1960s, as public concern mounted, the Corps was assigned a multifaceted water pollution study and reduction mission. Water Quality Units were established at District and Division levels, waste-water management studies were

initiated by OCE, and legal enforcement of water quality standards became a Corps mission. Federal courts determined the Refuse Act of 1899, originally enacted to prevent deposit of refuse in navigable channels, was also applicable to the discharge of pollutants into waterways. President Richard M. Nixon issued an Executive Order in 1971 establishing a permit program, enforced by the Corps, which required those discharging materials into the nation's rivers and lakes to meet stringent waste treatment standards. It appeared in 1975 that water quality maintenance would be a major continuing mission of the Corps of Engineers and the Louisville District.⁴⁵

Summary

The flood control program which began in the Louisville District in 1936 and 1937 had developed by 1975 into a comprehensive water resource development program as a result of the expansion of its scope by Congress over the years to include many additional project features. Public and political support for a particular project must be overwhelming before the Army Engineers recommend construction and before Congress provides funding. Local protection projects, whose benefits are limited to a small area, whenever local interests could agree to meet their obligation were constructed in large numbers in the Louisville District from the beginning

of the flood protection program. Flood control reservoirs, whose flood control benefits accrued chiefly to downstream areas, could not at first be constructed in the Louisville District because of intense public and political opposition from "upstream" interests. Citizens residing in reservoir areas could not be convinced the reduction of flood damages would compensate for the loss of their lands.

By authorizing such reservoir project features as water supply, recreation, fish and wildlife conservation, and pollution abatement, in addition to flood control, Congress established a multipurpose program with widespread benefits, for both up and down stream areas. And, in many cases, upstream interests began to support reservoir projects because of these multiple benefits and the economic improvements which such projects often stimulated.

The Corps comprehensive water resource program had revolutionary effects on living standards and life quality in the Lower Ohio Basin, as elsewhere in the nation, as it was implemented between 1936 and 1975. Changes occurred so slowly as to pass nearly unnoticed; nevertheless, a transformation with widespread political, economic, social, and cultural consequences transpired. The extent of the metamorphosis was indeed so pervasive that in the 1960s there were those who began to call for a halt to the Corps program.